| connectors                   |                   |                                     |                     |     |  |  |
|------------------------------|-------------------|-------------------------------------|---------------------|-----|--|--|
|                              | S                 | PECIFICATION                        | 1                   |     |  |  |
| 宏到                           | 女 電               | 子股份有限                               | 灵公司                 |     |  |  |
|                              | 桃                 | 園縣中壢市東園路13號                         | ŧ<br>L              |     |  |  |
|                              | No.1              | 13, Dongyuan Rd., Jhongli Ci        | ty,                 |     |  |  |
|                              | Taoyu             | an County 320, Taiwan (R.O          | .C.)                |     |  |  |
|                              | TEL               | : +886-3-463-2808                   |                     |     |  |  |
|                              | FAX               | X: +886-3-463-1800                  |                     |     |  |  |
| SPEC. NO.: PS-525            | 511-XX            | XXX-XXX REV                         | ISION: <u>A</u>     | _   |  |  |
| PRODUCT NAME:                | 0.5mr             | 0.5mm PITCH ZIF BACK FLIP FPC CONN. |                     |     |  |  |
|                              | SMT               | R/A D/C TYPE                        |                     | _   |  |  |
| <b>PRODUCT NO:</b>           | 5251 <sup>-</sup> | 1 SERIES                            |                     |     |  |  |
|                              |                   |                                     |                     | _   |  |  |
|                              |                   |                                     |                     |     |  |  |
| PREPARED: CHECKED: APPROVED: |                   |                                     |                     |     |  |  |
| Tsai, Wang Kun               |                   | Liu, Yuan Huang                     | Wang, Chun She      | eng |  |  |
| DATE:<br>2020/09/02          |                   | DATE:<br>2020/09/02                 | DATE:<br>2020/09/02 |     |  |  |

2010/10/31 TR-FM-73015L



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# **1** Revision History

| Rev. | ECN #       | Revision Description            | Prepared       | Date       |
|------|-------------|---------------------------------|----------------|------------|
| 1    | ECN-1902122 | NEW PROJECT SPEC FOR APD1080034 | Tsai, Wang kun | 2019.02.21 |
| Α    | ECN-000055  | ADD FPC RETENTION FORCE         | Tsai, Wang kun | 2020.09.02 |
|      |             |                                 |                |            |
|      |             |                                 |                |            |
|      |             |                                 |                |            |
|      |             |                                 |                |            |
|      |             |                                 |                |            |
|      |             |                                 |                |            |
|      |             |                                 |                |            |
|      |             |                                 |                |            |
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|      |             |                                 |                |            |



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## 2 SCOPE

This specification covers performance, tests and quality requirements for 0.5 mm pitch ZIF back flip FPC CONN. SMT R/A D/C TYPE.

## **3** APPLICABLE DOCUMENTS

EIA-364: ELECTRONICS INDUSTRIES ASSOCIATION

### 4 REQUIREMENTS

4.1 Design and Construction

- 4.1.1 Product shall be of design, construction and physical dimensions specified on applicable product drawing.
- 4.1.2 All materials conform to R.o.H.S 2.0. and the standard depends on TQ-WI-140101.

#### 4.2 Materials and Finish

- 4.2.1 Contact: High performance copper alloy (Phosphor Bronze)
  - Finish: (a) Contact Area: Refer to the drawing.
    - (b) Under plate: Refer to the drawing.
    - (c) Solder area: Refer to the drawing.
- 4.2.2 Housing: Thermoplastic or Thermoplastic High Temp., UL94V-0
- 4.2.3 Actuator: Thermoplastic or Thermoplastic High Temp., UL94V-0
- 4.2.4 Fitting Nail: Copper Alloy, Finish: Refer to the drawing.

4.3 Ratings

- 4.3.1 Working voltage less than 36 volts AC (per pin)
- 4.3.2 Voltage: 50 Volts AC (per pin)
- 4.3.3 Current: DC 0.5 Amperes (per pin)
- 4.3.4 Operating Temperature : -40°C to +85°C



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# 5 Performance

## 5.1. Test Requirements and Procedures Summary

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| Item                               | Requirement  | Standard  |  |  |
|------------------------------------|--|---|--|--|
| Examination of Product             | Product shall meet requirements of<br>applicable product drawing and<br>specification. | Visual, dimensional and functional<br>per applicable quality inspection<br>plan.  |  |  |
|                                    | ELECTRICAL   |   |  |  |
| ltem                               | Requirement  | Standard  |  |  |
| Low Level<br>Contact Resistance    | 100 m Ω Max.(initial)per contact<br>20 m Ω Max. Change allowed                         | Mate connectors, measure by dry<br>circuit, 20mV Max., 10mA Max.<br>(EIA-364-23)  |  |  |
| Insulation Resistance              | 50 M Ω Min.  | Unmated connectors, apply<br>500 V DC between adjacent<br>terminals.<br>(FIA-364-21)  |  |  |
| Dielectric<br>Withstanding Voltage | No discharge, flashover or<br>breakdown.<br>Current leakage: 1 mA max.                 | 200 VAC Min. at sea level for 1<br>minute.<br>Test between adjacent contacts of<br>unmated connectors.<br>(EIA-364-20)  |  |  |
| Temperature rise                   | 30℃ Max. Change allowed  | Mate connector: measure the<br>temperature rise at rated current<br>until temperature stable. The<br>ambient condition is still air at 25°C<br>(EIA-364-70 METHOD<br>1,CONDITION 1) |  |  |



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| MECHANICAL                               |                  |  |  |  |  |
|--|------------------|--|--|--|--|
| ltem                                     | Requirement      | Standard   |  |  |  |
| Durability                               | 10 cycles.       | The sample should be mounted in<br>the tester and fully mated and<br>unmated the number of cycles<br>specified at the rate of less than<br>10 cycles / minute. (EIA-364-09)  |  |  |  |
| FPC Retention Force                      | Refer to TABLE A | Apply axial pull out force at the speed rate of $25.4 \pm 3$ mm/minute.  |  |  |  |
| Terminal / Housing<br>Retention Force    | 20 gf MIN.       | Apply axial pull out force at the speed rate of $25.4 \pm 3$ mm/minute.<br>On the terminal assembled in the housing.   |  |  |  |
| Fitting Nail /Housing<br>Retention Force | 50 gf MIN.       | Apply axial pull out force at the speed rate of $25.4 \pm 3$ mm/minute. On the fitting nail assembled in the housing.  |  |  |  |
| Vibration                                | 1 μs Max.        | The electrical load condition shall<br>be DC 1 mA all contacts. Subject<br>to a simple harmonic motion<br>having amplitude of 0.76mm<br>(1.52mm maximum total excursion)<br>in frequency between the limits of<br>10 and 55 Hz. The entire<br>frequency range, from 10 to 55 Hz<br>and return to 10 Hz, shall be<br>traversed in approximately 1<br>minute. This motion shall be<br>applied for 2 hours in each of three<br>mutually perpendicular directions.<br>(EIA-364-28 Condition I) |  |  |  |
| Shock (Mechanical)                       | 1 μs Max.        | Subject mated connectors to<br>50 G's (peak value) half-sine shock<br>pulses of 11 milliseconds duration.<br>Three shocks in each direction<br>shall be applied along the three<br>mutually perpendicular axes of the<br>test specimen (18 shocks). The<br>electrical load condition shall be<br>DC 1mA for all contacts.<br>(EIA-364-27, test condition A)  |  |  |  |



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| ENVIRONMENTAL                                 |   |   |  |  |  |  |  |
|---|---|---|--|--|--|--|--|
| Item  | Requirement   | Standard  |  |  |  |  |  |
| Resistance to <b>Reflow</b><br>Soldering Heat | See Product Qualification and Test<br>Sequence Group 10 <b>(Lead Free)</b><br>No deformation of components<br>affecting performance.                              | Pre Heat : 150℃~180℃, 60~120sec.<br>Heat : 230℃ Min., 40sec Min.<br>Peak Temp. : 260℃ Max,<br>10sec Max.<br>Cycles : 2  |  |  |  |  |  |
| Hand Soldering<br>Temperature Resistance      | Appearance: No damage   | Temp: 350 ±10℃, 5 sec   |  |  |  |  |  |
| Thermal Shock                                 | See Product Qualification and Test<br>Sequence Group 4  | Mate module and subject to follow<br>condition for 5 cycles.<br>1 cycles:<br>$-55 \pm 3^{\circ}$ , 30 minutes<br>$85 \pm 2^{\circ}$ , 30 minutes<br>(EIA-364-32, test condition I)  |  |  |  |  |  |
| Humidity                                      | See Product Qualification and Test<br>Sequence Group 4  | Mated Connector<br>40 ±2℃, 90~95% RH,<br>96 hours.<br>(EIA-364-31,Condition A, Method II)   |  |  |  |  |  |
| Heat Resistance                               | See Product Qualification and Test<br>Sequence Group 5  | Mated connectors to temperature life<br>at $85 \pm 2^{\circ}$ for 96 hours.<br>(EIA-364-17, Test condition A)   |  |  |  |  |  |
| Cold Resistance                               | See Product Qualification and Test<br>Sequence Group 6  | Mated connectors to temperature life<br>at -40 $\pm$ 3°C for 96 hours.<br>(EIA-364-59A)   |  |  |  |  |  |
| Salt Spray<br>(Only For Gold Plating)         | See Product Qualification and Test<br>Sequence Group 7  | Subject mated/unmated connectors<br>to 5% salt-solution concentration,<br>$35^{\circ}C$<br>(I) Gold flash for 8 hours<br>(II) Gold plating 3u" for 48 hours.<br>(III) Gold plating $\ge 5$ u" for 96 hours.<br>(EIA-364-26) |  |  |  |  |  |
| Solder ability                                | Tin plating:<br>Solder able area shall have<br>minimum of 95% solder coverage.<br>Gold plating:<br>Solder able area shall have<br>minimum of 75% solder coverage. | And then into solder bath,<br>Temperature at 245 ±5℃, for 4-5<br>sec.<br>(EIA-364-52)   |  |  |  |  |  |
| SO <sub>2</sub> Gas                           | See Product Qualification and Test Sequence Group 12.   | Mate applicable FPC and expose to $50 \pm 5ppm SO_2$ gas at $40 \pm 2^{\circ}C$ for 24 hours.   |  |  |  |  |  |
| NH₃ Gas                                       | See Product Qualification and Test Sequence Group 13.   | Mate applicable FPC and expose to $28\%$ NH <sub>3</sub> gas for 40 minutes.  |  |  |  |  |  |

**Note.** Flowing Mixed Gas shell be conduct by customer request.





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## 7 PRODUCT QUALIFICATION AND TEST SEQUENCE

|                                       | Test Group |     |     |          |       |       |      |       |   |    |    |       |       |
|---------------------------------------|------------|-----|-----|----------|-------|-------|------|-------|---|----|----|-------|-------|
| Test or Examination                   | 1          | 2   | 3   | 4        | 5     | 6     | 7    | 8     | 9 | 10 | 11 | 12    | 13    |
|                                       |            |     |     | 1        | r     | Test  | Sequ | ience | ; |    | 1  | 1     |       |
| Examination of Product                |            |     |     | 1、7      | 1、6   | 1、6   | 1、4  |       |   | 1  | 1  | 1、4   | 1、4   |
| Low Level Contact Resistance          |            | 1、5 | 1、4 | 2、<br>10 | 2、9   | 2 • 9 | 2、5  |       |   | 3  |    | 2 • 5 | 2 • 5 |
| Insulation Resistance                 |            |     |     | 3、9      | 3、8   | 3 • 8 |      |       |   |    |    |       |       |
| Dielectric Withstanding Voltage       |            |     |     | 4 \ 8    | 4 • 7 | 4 • 7 |      |       |   |    |    |       |       |
| Temperature rise                      | 1          |     |     |          |       |       |      |       |   |    |    |       |       |
| Durability                            |            | 3   |     |          |       |       |      |       |   |    |    |       |       |
| Vibration                             |            |     | 2   |          |       |       |      |       |   |    |    |       |       |
| Shock (Mechanical)                    |            |     | 3   |          |       |       |      |       |   |    |    |       |       |
| Thermal Shock                         |            |     |     | 5        |       |       |      |       |   |    |    |       |       |
| Humidity                              |            |     |     | 6        |       |       |      |       |   |    |    |       |       |
| Heat Resistance                       |            |     |     |          | 5     |       |      |       |   |    |    |       |       |
| Cold Resistance                       |            |     |     |          |       | 5     |      |       |   |    |    |       |       |
| Salt Spray(Only For Gold Plating)     |            |     |     |          |       |       | 3    |       |   |    |    |       |       |
| Solder ability                        |            |     |     |          |       |       |      | 1     |   |    |    |       |       |
| FPC Retention Force                   |            | 2、4 |     |          |       |       |      |       |   |    |    |       |       |
| Terminal / Housing Retention Force    |            |     |     |          |       |       |      |       | 1 |    |    |       |       |
| Fitting Nail /Housing Retention Force |            |     |     |          |       |       |      |       | 2 |    |    |       |       |
| Resistance to Soldering Heat          |            |     |     |          |       |       |      |       |   | 2  |    |       |       |
| Hand Soldering Temperature Resistance |            |     |     |          |       |       |      |       |   |    | 2  |       |       |
| SO₂ Gas                               |            |     |     |          |       |       |      |       |   |    |    | 3     |       |
| NH₃ Gas                               |            |     |     |          |       |       |      |       |   |    |    |       | 3     |
| Sample Size                           | 2          | 4   | 4   | 4        | 4     | 4     | 4    | 2     | 4 | 4  | 4  | 4     | 4     |

| Лč      |                              | Aces P/N: 52511-X | XXXX-XXX series       | 5              |
|---------|------------------------------|-------------------|-----------------------|----------------|
| TITLE   | 0.5 mm PITCH ZIF BACK FL     | IP FPC CONN. SMT  | R/A TYPE              |                |
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| 8 FF    | C RETENTION FORCE(TAB        | SLE A)            | Unit: gf              |                |
|         | No. of CKT                   | 1 st Min.         | 10 <sup>th</sup> Min. |                |
|         | 4                            | 110               | 70                    |                |
|         | 6                            | 165               | 106                   |                |
|         | 8                            | 220               | 141                   |                |
|         | 10                           | 275               | 176                   |                |
|         | 12                           | 330               | 211                   |                |
|         | 14                           | 385               | 246                   |                |
|         | 16                           | 440               | 282                   |                |
|         | 18                           | 495               | 317                   |                |
|         | 20                           | 550               | 352                   |                |
|         | 22                           | 593               | 387                   |                |
|         | 24                           | 642               | 407                   |                |
|         | 26                           | 678               | 455                   |                |
|         | 32                           | 804               | 560                   |                |
|         |                              |                   |                       |                |
|         |                              |                   |                       |                |
|         |                              |                   |                       |                |

There may be the case which the connector performance does not meet the above specification, because the different FPC manufacturers have their own unique specification.

|     | CONNECTORS   | Aces P/N: 52511-XXXXX-XXX series   |
|-----|--|--|
| Т   | ITLE: 0.5 mm PITCH ZIF BACK F  | FLIP FPC CONN. SMT R/A TYPE  |
| REL | EASE DATE: 2020/09/02 REVISION: A  | ECN No: ECN-000055 PAGE: 11 OF 14  |
| 9   | Connector Operation  |  |
| Ex  | ercise care when handling connec   | ctors. Follow recommendations given below.   |
| A.  | Please open and close the actuate the FPC inserted. The actuator ractuator in the state that FPC is        | ator with the connector is mounted on the P.C.Board, and might not come off from the opening and shutting of the s not inserted and do not do, please. |
| В.  | FPC Correct insertion verification<br>A visual comparison of the edge<br>prevent diagonal inser-tion and p | n<br>e of the housing opening and the FPC pattern boundary will<br>partial insertion errors.   |
|     |  | rrect insertion  |



### C. Locking

After FPC/FFC insertion, rotate the actuator down to a full stop, pushing it at the center.





About the lock operation When you lock, it is recommended what the actuator does as a whole, and the actuator was shut surely.



| <b>ACES</b>  |     |             | Aces P/N: 5 | 2511-XXXXX-XX      | X series       |
|--|-----|-------------|-------------|--------------------|----------------|
| TITLE: 0.5 mm PITCH ZIF BACK FLIP FPC CONN. SMT R/A TYPE |     |             |             |                    |                |
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#### D. Lock release

Carefully rotate the actuator up to 90°, lifting it at the center.





• The actuator opens by rotating it in the direction OPPOSITE to the direction of the insertion of the FPC. DO NOT attempt to open it from the same side as the insertion of the FPC.



